

REMARKS

By the above amendment in the accompanying RCE, claims 78- 89, as rejected in the Office Action dated July 26, 2005, which claims are directed to the apparatus, have been canceled without prejudice or disclaimer of the subject matter thereof, and new claims 90 - 104 directed to the method of the present invention have been presented.

As to the rejection of claims 78-85 under 35 U.S.C. §103(a) as being unpatentable over Tsuji et al., JP 4-214873 in view Shinji, JP 9-275092 and Ishioka, JP3-104222, and the rejection of claims 86-89 under 35 U.S.C. §103(a) as being unpatentable over Tsuji et al., JP 4-214874 in view of Shinji, JP 9-275092 and Ishioka, JP3-104222 further in view of Powell et al., U.S. Patent 4,971,653 or Kaneko et al., U.S. Patent 5,223,113, such rejections are considered to be obviated by the cancellation of claims 78-89, such that discussion of the cited are in relation to such claims is considered unnecessary. Insofar as such rejections may be considered applicable to the newly submitted claims 90-104, such rejections are traversed insofar as they are considered applicable thereto, and reconsideration and withdrawal of the rejections are respectfully requested.

As noted above, by the present amendment, claims 90-104 which are directed to the method of the present invention have been presented, whereas previously, claims 78-89 were directed to the apparatus. In accordance with the present invention, the newly submitted claims which include independent claims 90 and 98, recite a plasma etching method for processing a sample inside a processing chamber, wherein the processing of the sample utilizes a plasma generated in a space which is surround by a sidewall member, represented by the sidewall 102 and

jacket 103 in Figure 1, for example, which has a substantially cylindrical shape and is electrically grounded to earth, and an upper member of the processing chamber as a ceiling thereof is disposed above the sample stage and adjacent to the sidewall member, which ceiling member includes an electrically conductive plate 111, disposed in opposition to the sample. During the processing of the sample using the plasma, a bias is applied on the surface of the electrically conductive plate and a temperature of the sidewall member is made lower than a temperature of the sample and a temperature of the upper member is made higher than the temperature of the sample. More particularly, as described at page 19, lines 8 and 9 of the specification, the temperature of a wafer is controlled within a range of 100°C to 110°C, whereas as described at page 21 lines 18-24, of the specification, the inner wall surface temperature in the reactor is controlled to a temperature which is sufficiently lower than the temperature of the wafer within a range of 25°C to 80°C, for example, so that a strong coating film is formed on the inner walls surface, as described at page 23, lines 5-25 of the specification, wherein the film which is formed is highly resistant to plasma, and peeling of reaction products and adhesion of particles onto the sample surface are reduced, so that it acts as a protection film for the inner wall surface of the reactor. Furthermore, as described at pages 26-28 of the specification, the temperature of the disc electricity conductor 111, the plate 115 and the ring 116 is controlled so that as pointed out at page 28, lines 8-17 of the specification, the temperature can be in a range of 150°C to 200°C whereby deposition of reaction products is controlled and the occurrences of foreign substances due to peeling of reaction products can be reduced. Thus, in the present invention the temperature of different portions of a processing chamber, which inner surfaces thereof face the plasma generated therein, includes one area in which the

temperature is controlled to be lower than the temperature of the sample and another area which is controlled to be at a temperature which is higher than that of the sample, during processing of the sample, and which areas are adjacent one another.

In accordance with the present invention, interactions arising on the inner surfaces of the processing chamber between the inner surfaces and the plasma facing thereto, and also the influences by the interactions to process the sample located inside of the processing chamber, are controlled, so as to improve the repeatability or reliability of the process. That is, by adjusting the temperature of the sidewall to be lower than the sample temperature, deposits of reaction products on the sidewall surface is prevented from being peeled off as a cluster or disassociated from the surface after being deposited thereon. Such function stabilizes the interactions between the sidewall surface and the plasma and can be more readily controlled by circulating a heat exchanging medium in a removable jacket, as disclosed and claimed. With regard to the upper member, forming a ceiling member of the processing chamber, which is made to have a higher temperature than that of the sample and likewise higher temperature than that of the sidewall, such feature enables reduction of deposits of the reaction products so that influences such as contaminations by the deposits to the sample which is located below the upper member or ceiling of the processing chamber, can be reduced. In accordance with the present invention the upper member includes an electrically conductive plate which faces to the plasma and is disposed in opposition to the sample and has a bias voltage applied thereof. The bias voltage induces charged particles such as ions onto the plate surface, which serves for heating the surface to increase the plate

temperature, and thus, particles in the plasma, such as reaction products, are prevented from depositing on the plate surface in the manner described.

Applicants submit that newly presented independent claims 90 and 98, which are directed to the method of the present invention, clearly recite the aforementioned features, and such features as recited in the independent and dependent claims are not disclosed or taught in the cited art as we come clear from the following discussion.

With regard to the combination of Tsuji et al., Shinji, and Ishioka, irrespective of the Examiners contentions, Applicants submit that none of this cited art taken alone or in any combination thereof, discloses or teaches that during the processing of the sample, a bias is applied on a surface of the electrically conductive plate, a temperature of the sidewall member is made lower than a temperature of the sample, and a temperature of the upper member is made higher than the temperature of the sample, as recited in independent claims 90 and 98 of this application. That is, assuming arguendo that Tsuji et al. discloses a member 20 held on an inner surface of a sidewall of the vacuum vessel, which member has a thermally conductive medium supply therein, and a temperature controller so as to adjust the thermally conductive medium so as to control the temperature of the member within a predetermined range, Tsuji et al. provides no disclosure or teaching of making the temperature of the sidewall member at the processing chamber lower than a temperature of a sample disposed in the processing chamber in the manner set forth, and including the temperature of the upper member higher than the temperature of the sample during the processing of the sample, with the intended advantages, as described in the specification of this application. Likewise, as recognized by the Examiner, Shinji and Ishioka do not disclose or teach the

aforementioned claimed subject manner, it being noted that the Examiner contended that the aforementioned features were directed to method limitations, which were not considered in conjunction with apparatus claims. Applicants submit that such features are now clearly set forth in the method claims, and such features can no longer be disregarded, which features are not disclosed or taught by Tsuji et al., Shinji and/or Ishioka taken alone or in any combination thereof. Thus, Applicants submit that independent claims 90 and 98 and the dependent claims patentably distinguish over this proposed combination of references in the sense of 35 U.S.C. §103, and all claims should be considered allowable thereover.

Applicants note that the Examiner has additionally added Powell et al. or Kaneko et al. to the previously utilized references so as to provide for temperature control. Irrespective of the addition of these patents to the other cited art, it is readily apparent that this combination also does not disclose control of temperature of the sidewall member and the upper member from the ceiling of the processing chamber to be different from one another and different from the temperature of the sample or wafer during processing in the manner set forth in the independent and dependent claims of this application. As such, Applicants submit that each of the independent claims and the dependent claims are patentably distinguished over this proposed combination of references in the sense of 35 U.S.C. §103 and all claims should be considered allowable there over.

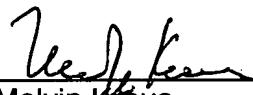
With respect to the dependent claims, Applicants note that the dependent claims recite additional features, which when considered in conjunction with the parent claims further patentably distinguish over the cited art in the sense of 35 U.S.C. §103 and should be considered allowable there over.

In view of the above amendments and remarks, Applicants submit that all claims patentably distinguish over the cited art and recite features which must be given patentable consideration by the Examiner, irrespective of the Examiners previous position with regard thereto. Accordingly, Applicants submit that all claims should now be considered allowable over the cited art.

In view of the above amendments and remarks, Applicants submit that all claims present in this application should now be in condition for allowance and issuance of an action of a favorable nature is courtesy solicited.

To the extent necessary, applicant's petition for an extension of time under 37 CFR 1.136. Please charge any shortage in the fees due in connection with the filing of this paper, including extension of time fees, to Deposit Account No. 01-2135 (520.34403CV4) and please credit any excess fees to such deposit account.

Respectfully submitted,



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